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Abstract
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Ideological classification, ideological tendency, policy space, United Kingdom, voters/citizens

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Introduction

During the past decade, Voting Advice Applications (VAAs) have been employed in a number of diverse national settings, especially in Europe, but also, increasingly, outside the continent. Ostensibly, the aim of the VAA is to help voters decide which party or candidate most closely matches their policy preferences. Its primary logic is therefore that of an application to benefit the voter, rather than a survey tool. However, given the large datasets it can generate, the VAA also has great potential as a device that could be used in research on the political orientation of citizens. It is this potential that our article intends to exploit. Specifically, the focus is on how Voting Advice Applications (VAAs) can be used to extend our understanding of underlying policy dimensions in a polity and the relative positioning of supporters of political parties.[1]

The article proceeds as follows. First, we provide an overview of the methods that have been used so far to map political parties and examine ways in which the policy space can be conceptualized in terms of broad policy dimensions. We then introduce our own methodology for party mapping, which consists of two main innovations: the use of a VAA, specifically the 2011 Scottish Vote Compass (SVC), to gather data, and the application of a dimension reduction technique (principal factor analysis) to identify the most salient policy dimensions. Our next step is to use this technique to identify the main policy dimensions that define the political landscape in Scotland and the positions of the supporters of five political parties with respect to these dimensions using data generated from the SVC. We then turn our attention to the issue of the validity of our data and address the criticism that the use of a VAA as a data-gathering device is not valid because respondents are (a) not representative of the population at large and are (b) not party supporters at all, but rather uncommitted voters who are yet to decide how to vote. To do so, we compare samples of our VAA data with data from a representative survey, the Scottish Election Study (SES), which was also carried out shortly before the 2011 Holyrood elections. Finally, to assess whether our overall findings regarding the policy positions of party supporters are valid, we attempt to verify these positions by drawing on expert opinions on the political orientations of Scottish political parties. We conclude that data extracted from VAAs can indeed help us to understand how the policy space within a polity is structured and the niches that parties fill within that space.

Party mapping: The state of the art

Various methods have been used to measure the policy positions of political parties. A commonly used method is the expert survey in which independent experts code parties according to a set of already defined policy dimensions (Benoit and Laver, 2006; Castles

and Mair, 1984; Huber and Inglehart, 1995). Another approach is to use elite surveys in which politicians and party functionaries are asked to position their own parties in terms of policy (Kitschelt et al., 1999). A third method is content analysis of policy statements drawn from election manifestos or other documents; the most noteworthy example of this method is the Manifesto Research Group/Comparative Manifestos Project (MRG/CMP), which began in 1979 and now purports to include content analyses of party election programmes from more than 50 countries since 1945 (Budge et al., 1987, 2001; Klingemann et al., 2006). Mass surveys are more rarely used for party mapping, and when they are they tend to be used to elicit from respondents the *perceived* position of parties or candidates with respect to a number of policy dimensions (Alvarez and Nagler, 2004; Bonilla et al., 2009).

The method that we employ in this article is that pioneered by Sani and Sartori (1983), who drew data from a mass survey in order to measure party polarization based on the self-defined location of party supporters. More recently such a method has been used to compare the policy orientations of party voters with those of party elites in Switzerland (Leimgruber et al., 2010). Underlying the method used in this article is our belief that political parties are defined not only by party elites and manifestos but also by party supporters at the grassroots level, or, to use V. O. Key's classic term, 'the party-in-the-electorate' (1964). In our view, the policy orientations of party supporters are equally an essential feature of any party system, as are the purported orientations of party leaders or policy statements articulated in manifestos. Our method, then, opens the door to future scholars to examine how well parties represent and reflect the positions of rank-and-file supporters, for example, by comparing the dimensionality of policy space as extracted from party supporters with the dimensions defined through the analysis of manifestos.

Additionally, our analysis reveals a unique Scottish political space (defined by the mass electorate) in which the political parties must position themselves. This understanding helps to shed light on how nationalist parties can influence the political space in multi-level systems containing strong national sub-levels. Indeed, the centre-periphery cleavage, identified by Lipset and Rokkan (1967) as among four key cleavages in European politics, but one that was deemed less relevant in British politics, retains relevance in Scottish politics. The existence of the Scottish National Party (SNP), seeking independence for Scotland and articulating Scotland's interests in UK politics, is the main but not the only manifestation of this cleavage's continuing relevance. Other evidence has been the distinctive Scottish party organizations for the three main British parties in Scotland (the *Scottish* Labour Party, the *Scottish* Conservative Party and the *Scottish* Liberal Democrats) which, together with the SNP, constitute a distinct Scottish party system and issue space.

A key challenge addressed in this article is identifying the dimensions that define the Scottish policy space. It has long been suggested that voters and party elites identify with a certain set of core values – or ideologies – which can be placed on a spectrum from Left, representing a socialist ideology, to Right, which embodies a free market, capitalist ideology. Typically, Left and Right refer to *economic* ideologies, specifically who should own the means of production – the public or the private sector. In 1990, Bartolini and Mair argued that the Left–Right dimension remained the dominant dimension in most Western countries (Bartolini and Mair, 1990).

However, following the collapse of communism in Eastern Europe and the former Soviet Union and the tendency of centre-left parties in Western Europe to adopt a pro-free market ideology, the old Left–Right divide was seen to have lost much of its salience. Instead, a new set of issues became more pertinent. In many western European countries, attitudes towards crime, immigration and environmental issues seem to have become more important in defining inter-party competition than the economic issues that have traditionally divided Left and Right. Kitschelt (1994) therefore identified a new axis of party competition to distinguish libertarian from authoritarian values. More recently this dimension has been termed the GAL–TAN dimension, with GAL representing green / alternative / libertarian values and TAN representing traditionalism / authority / nationalism (Marks et al., 2006). Kriesi et al. (2006) argue that the process of globalization has created a new social cleavage between 'winners' and 'losers' in a newly globalized Europe, and that 'losers' have tended to adopt a position of 'demarcation' based on opposition to immigration and European integration. This tendency, they contend, has further transformed the GAL–TAN dimension, integrating new issues such as immigration and EU membership into a pre-existing cultural cleavage.

In this article, we use exploratory factor analysis to extrapolate latent dimensions from the data. The advantage of this a posteriori method is that it does not impose pre-given policy dimensions on survey data (typically Left–Right or Left–Right and GAL–TAN) irrespective of whether the dimensions chosen are appropriate for the particular socio-political context in which the survey is carried out. In this way we can extract as many distinct policy dimensions as appear relevant to a given context.

The VAA as a tool for extracting data

The survey tool that we use to obtain our data is an online questionnaire called a Voting Advice Application (VAA), which has recently been used in a number of countries to help voters identify parties that share a similar policy orientation to themselves (for a review of VAA experiments, see Hooghe and Teepe (2007), Ramonaitė (2010), Trechsel and Mair (2011), Wall et al. (2009), Walgrave et al. (2009)). The online questionnaire typically consists of a set of policy statements (usually between 30 and 40) on which the parties' positions have been coded, either by academic experts or by the parties and/or candidates themselves. After navigating to the VAA website, citizens are then able to fill in the same questionnaire and the system produces a rank ordering of candidates/parties according to the degree of overlap with citizens' preferences.

Hitherto, research on VAAs has focused mainly on technical issues regarding their design and implementation. Such issues include the design effects of VAAs (Louwerse and Rosema, 2011), the effects of VAA statement selection (Walgrave et al., 2009), the relevance of ideological dimensions such as Left versus Right for statement selection (Costa Lobo et al., 2010), and the potential impact of VAAs on voting behaviour (Ladner et al., 2010). However, little attention has been paid to the potential of the VAA as a data-gathering device that could help us to cast light on some of the most salient issues regarding political behaviour. It is the feasibility of using VAA-generated data as a tool for mapping mass party supporters that this article seeks to explore.

Since VAAs are deployed during an election campaign, they can attract many users, thereby generating potentially large datasets at a time when interest in voting and in party politics is relatively high. Such large datasets can rarely be obtained from conventional surveys, and they easily lend themselves to the purpose identified in the previous section, namely the mapping of groups of individuals on a policy space. Already VAAs have been used to map the policy positions of political parties by examining how parties have coded themselves on the policy statements (Trechsel and Mair, 2011), but in this article we intend to go further by exploiting users' responses to issue statements to map the policy positions of party supporters. A well-designed VAA can include supplementary questions on party affiliation, allowing us to identify party supporters, explore their attitudes towards the most pertinent political issues of the day and show how ideological differences define and delimit them.

Of course, a critic may counter that VAAs cannot be used for party mapping because the VAA is marketed as – and indeed its purported function is – a tool that is used by voters who have not yet decided how to vote. It should not therefore hope to measure the policy orientations of *party supporters*. We reject this criticism. VAA respondents navigate to a VAA website for a variety of reasons – curiosity, novelty, a general interest in politics and elections, to confirm that they support the 'correct party' and to see where their own policy positions fall compared to all of the political parties. For these reasons, we find that a substantial proportion of VAA respondents may be broadly classified as 'party supporters', as discussed below. Moreover, as we show later in the article, a comparison of VAA data from Scotland obtained in the month prior to the 2011 elections for the Holyrood parliament and data obtained from a representative survey during the same period suggests that users of the VAA, or at least those declaring a party affiliation, far from being undecided voters with no clear party preference, are relatively politically committed. In terms of most of the issue statements that the two surveys had in common, party supporters using the VAA were both more polarized and more coherent in their views than the party supporters that responded to the nationally representative Scottish Election Study survey.

Another question that arises with Internet-based surveys is the issue of sample representativeness. Indeed, there is a lively debate among scholars as to the value of using Internet-based surveys for national election studies (Chang and Krosnick, 2009; Malhotra and Krosnick, 2007; Sanders et al., 2007; Stephenson and Crête, 2011). While typically the VAA is accessed by a self-selected sample of relatively well-educated (and disproportionately young or middle-aged) voters and cannot therefore be considered to be a representative sample of the electorate, we would argue that the lack of representativeness does not necessarily undermine the reliability and validity of our efforts if our aim is to study the structure of party supporters' issue positions (as opposed to the general public's issue positions). To understand why it is not a fatal flaw we must bear in mind that traditional methods for mapping parties (such as 'expert' surveys, surveys of party elites or manifesto analysis) are not representative, nor are they supposed to be (Gemenis, 2011). Using VAAs to derive the location of party supporters in the policy space is simply a new and innovative technique for mapping the policy orientations of party supporters. We deal further with the question of representativeness later in the article.

The Scottish Vote Compass

A VAA, henceforth referred to as the Scottish Vote Compass (SVC), was carried out in Scotland during the run up to the Holyrood elections on 5 May 2011. Respondents were asked to give their opinion on a set of 30 policy statements that were designed to reflect the most salient political issues. For each policy statement, respondents were offered a five-point scale: 'Completely Agree', 'Agree', 'Neither Agree nor Disagree', 'Disagree' and 'Completely Disagree'. In addition, a user could indicate 'No Opinion'. The main political parties in Scotland were also coded on each of the 30 policy statements by experts and the VAA matched the responses of each user with the expert coding for each party in order to find the party that corresponded best to the user's policy preferences. The five parties that were coded were those having representation in the previous session of the Scottish Parliament and projected to win seats in the May 2011 election (i.e. the Scottish National Party (SNP), the Scottish Labour Party, the Scottish Conservative Party, the Scottish Liberal Democrats and the Scottish Greens). The expert team (consisting of political scientists from the University of Strathclyde) agreed the policy positions of each party approximately seven weeks before polling day after consulting well-established Scottish political journalists.[2] These positions were then sent to the headquarters of all five parties for confirmation.

In addition to providing opinions on policy statements, respondents were also asked to answer supplementary questions on personal characteristics (age, sex, education) and voting behaviour. Questions on voting behaviour included three questions on party affiliation, specifically: (a) which political party they felt closest to, (b) which political party they intended to vote for in the constituency vote, and (c) which party they would support in the regional vote. For all three questions the option 'none' was available. Party supporters were defined as those who indicated support for the same party on all three questions, or, if the selected party was not participating in the constituency vote (e.g. the Scottish Green Party), those who indicated support for the same party on questions (a) and (c).[3] As most psephologists tend to rely on respondent self-reported party support or identification, our definition of 'party supporters', incorporating intended vote choice, is obviously more stringent than that used in the analysis of most election studies; however, we chose to err on the side of caution in this analysis, given the nature of the method of data collection. Beyond the party support and vote intention questions, a fourth question in the SVC asked users why they intended to vote for their party of choice with the options: (a) I prefer the party's leader(s) to those of other parties; (b) The party's ideas are closest to my own; (c) The party protects the interests of people like me; (d) The party is more competent to deal with the challenges that Scotland faces; and (e) Other. Within the group of party supporters, we were able to define a subgroup of ideological party supporters that provided the answer (b) for this question. This 'core' group of voters is used for mapping parties in the subsequent sections given that their preferences are based on their policy positions rather than on other (non-ideological) factors.

Data provided by respondents on all questions were stored for analysis.[4] The SVC generated a large dataset; the total number of entries came to just under 20,000 (19,236), excluding incomplete entries. However, not all users provide additional information such as party affiliation and not all entries in the VAA generated dataset

Table 1. Holyrood election results with breakdown of Scottish vote compass sample

	Holyrood election results		Vote compass	
Party	% of vote: Regional list	% of vote: Constituency	Party supporters[1]	Ideological supporters[2]
SNP	44.04	45.39	2,886 (43.28%)	1,040 (29.75%)
Sc. Labour Party	26.31	31.69	1,508 (22.62%)	799 (22.85%)
Sc. Conservative Party	12.36	13.91	573 (8.59%)	366 (10.47%)
Sc. Lib Dems	5.20	7.93	544 (8.16%)	417 (11.93%)
Sc. Greens	4.38	–	850 (12.75%)	659 (18.85%)
Others	7.71	1.08	307 (4.60%)	215 (6.15%)
Unaffiliated			5,385	–

1. Party supporters are those respondents who indicated they felt 'closest to' and would vote for a party in both the constituency and regional votes. The percentages given are of all those defined as party supporters (i.e. excluding unaffiliated users).

2. Ideological supporters are party supporters who also indicated that they intended to vote for a party because the party's 'ideas are closest to my own'. The percentages given are of all those defined as ideological supporters of the five main parties.

could be considered valid. Many users may have used the application more than once or may simply have been experimenting with the tool. We used various techniques for identifying such entries and filtering them out. After the data had been cleaned, a dataset of 12,053 respondents remained.[5] The number of party supporters in the dataset, including the subset of 'core' ideological voters, together with the percentage of the vote won by each party in the constituency vote and the regional lists, is given in Table 1.[6]

Analysis and results

The first part of our analysis involved extracting latent policy dimensions from the responses of all 12,053 users to the 30 issue statements. Initially, we used a principal factor analysis with varimax rotation to extract three components from the 30 response variables (all those for which the corresponding eigenvalues were greater than unity). These three components were labelled x, y and z and are given in Table 2. In order to test the internal consistency of each component, we then grouped together those variables that loaded most strongly onto each (with the modulus of the loading coefficient at least 0.4), and performed a Cronbach's alpha reliability analysis on each group.[7] As all the values of Cronbach's alpha were above 0.7 (0.750, 0.737 and 0.744, respectively, for the components identified below as x, y and z), we concluded that our components were sufficiently internally consistent to be considered as distinct policy dimensions.

In terms of how we interpret the three components extracted, it seems that the x dimension represents a traditional economic Left versus economic Right, the y dimension represents a spectrum of values relating to law and order, immigration and environmental protection, rather similar to the so-called GAL–TAN dimension, while the z dimension represents sentiments in favour of greater Scottish autonomy or independence at one extreme versus unionist sentiments at the other. Taking all loadings with a modulus greater than 0.4 (shown in boldface in Table 2) to indicate the importance

Table 2. The policy space: Scotland (all valid users)

Item	Question	Ec. L/R*	GAL/TAN*	Aut*
1	For less serious offences, shorter, community sentences should replace imprisonment.	–0.1025	**–0.4770**	0.2157
2	To reduce crime, the criminal justice system must clamp down harder on illegal drug use.	0.1334	**0.5830**	–0.0536
3	Mandatory prison sentences for anyone found carrying a knife should be used to cut down on knife-crime.	0.0539	**0.5362**	–0.1285
4	We need to ring-fence the number of police.	–0.0448	0.2140	0.0943
5	People must accept more surveillance (CCTV) to fight against terrorism and other violent crimes.	0.1288	**0.5061**	–0.1428
6	A single Scottish police force would be the most efficient way to safeguard public safety.	0.1652	–0.0312	0.0953
7	The highest economic priority of the Government should be paying off the public debt in the short term.	**0.5265**	0.2892	–0.1297
8	Government policies should promote quality of life over economic growth.	**–0.4109**	–0.1846	0.2526
9	The Scottish Government should make more use of tax-varying powers to raise revenue.	–0.2105	–0.1652	0.3280
10	In the current economic climate, the Government should maintain the size of the public sector.	**–0.6078**	–0.0275	0.1492
11	The third sector (voluntary organizations and charities) should have a larger role in providing public services.	0.3344	0.1020	0.0488
12	Scotland would be better off with an expansion of the powers devolved to the Scottish Parliament.	–0.0939	–0.1253	**0.7279**
13	In Westminster, new laws affecting England should only be voted on by MP's with English constituencies.	0.1488	0.0760	0.2804
14	Scotland would be better off, economically and socially, if it was an independent country within the European Union.	–0.0736	–0.0764	**0.7445**
15	Elections would be fairer if the Alternative Vote system replaced the First-Past-the-Post system.	–0.1493	–0.3281	0.2809
16	UK membership in the Euro should be ruled out indefinitely.	0.1615	**0.4121**	–0.1351
17	Economic growth is more important than reducing greenhouse gases.	0.2883	**0.4058**	–0.1707
18	Investment in public transport should be promoted through green taxes such as road taxes.	–0.1905	–0.2941	0.1483
19	Scotland must continue to build and use nuclear power stations.	0.2412	0.1378	**–0.4317**
20	Free bus passes should only be available for the least well off and not for all people over a particular age.	0.2818	–0.1013	–0.1114
21	A special policy on immigration should be established for Scotland, allowing more immigration into Scotland than England.	–0.1190	**–0.5195**	0.2722
22	Britain should scrap the Trident nuclear weapons system.	–0.2412	**–0.4099**	**0.4953**
23	The UK mission in Afghanistan is necessary in the fight against terrorism.	0.2053	0.2507	–0.3187

(continued)

Table 2. (continued)

Item	Question	Ec. L/R*	GAL/TAN*	Aut*
24	Local control of public services is more important than the efficiency gains from centralising services.	–0.1842	0.1090	0.1509
25	Policies should encourage personal responsibility rather than public, or government, responsibility for individual welfare.	**0.5634**	0.2933	–0.0496
26	Free medical prescriptions for all should be abolished.	0.3949	–0.0247	–0.3502
27	Schools established by parents and voluntary associations should be allowed to compete for public funds with state schools.	**0.4220**	0.2618	0.0227
28	Outsourcing to private companies could make the Scottish NHS more efficient.	**0.5684**	0.2222	–0.1636
29	Spending on the Scottish NHS should be protected regardless of the total budget.	**–0.4631**	0.2603	0.2231
30	University students should contribute to the costs of their education after graduation.	0.3931	0.1226	–0.2294

*Ec. L/R refers to the loading on the x-axis (Economic Left versus Right); GAL/TAN refers to the loading on the y-axis (GAL–TAN); Ind refers to the loading on the z-axis (Scottish Autonomy).

of a particular question with respect to a given dimension, we see that Items 7, 8, 10, 25, 27, 28 and 29 load onto the x-axis, Items 1, 2, 3, 5, 16, 17 and 21 load onto the y-axis and Items 12, 14 and 19 load onto the z-axis (see Table 2). Item 22 (on scrapping the Trident missile system) appears to load onto both the y-axis and the z-axis. This is not surprising, since the Trident submarine-launched nuclear ballistic missile system, which is based at the Faslane Naval Base (HMNB Clyde) on Scotland's west coast, is opposed by Scottish nationalists and is also seen as an issue relating to Scottish sovereignty. However, as one would expect with issues of defence, it also loads onto the GAL–TAN (y) dimension, albeit less strongly. It is also noteworthy that the issue of whether to continue to build and use nuclear power stations (Issue 19) loads onto the autonomy (z) dimension, rather than the GAL–TAN (y) dimension, on which environment-related issues are supposed to load. We conjecture that this is because, since 2007, the Scottish government in Holyrood under the leadership of the Scottish National Party (SNP) has adopted a 'no new nuclear power strategy' and nuclear power is seen by many pro-independence Scots as an imposition from London.

In order to estimate the position of each user along the three underlying dimensions, we need to employ a further, rather more rigorous, test that will help us to decide which of the items that appear to load onto each of the three dimensions given in Table 2 can be combined to form a single composite dimension. Applying Mokken's automated item selection algorithm (with a lower bound for the item scalability coefficient (H_i) set at 0.3 and alpha=0.05) to the 18 items identified above that appear to load onto one or other latent dimension according to Table 2, we find that 4 of these items are unscalable, while the other 14 all belong to one of 3 distinct scales that correspond precisely to the 3 dimensions we identify above. Thus, Items 8, 16, 17 and 29 are found to be unscalable, Items 7, 10, 25, 27 and 28 belong to the first scale (i.e. economic Left versus Right),

Table 3. Mokken scales with scalability coefficients (H_i)

Item	Question	Scales		
		Ec. L/R*	GAL/TAN*	Aut*
1	For less serious offences, shorter, community sentences should replace imprisonment.		**0.375**	
2	To reduce crime, the criminal justice system must clamp down harder on illegal drug use.		**0.387**	
3	Mandatory prison sentences for anyone found carrying a knife should be used to cut down on knife-crime.		**0.366**	
5	People must accept more surveillance (CCTV) to fight against terrorism and other violent crimes.		**0.367**	
7	The highest economic priority of the Government should be paying off the public debt in the short term.	**0.420**		
10	In the current economic climate, the Government should maintain the size of the public sector.	**0.364**		
12	Scotland would be better off with an expansion of the powers devolved to the Scottish Parliament.			**0.500**
14	Scotland would be better off, economically and socially, if it was an independent country within the European Union.			**0.508**
19	Scotland must continue to build and use nuclear power stations.			**0.388**
21	A special policy on immigration should be established for Scotland, allowing more immigration into Scotland than England.		**0.360**	
22	Britain should scrap the Trident nuclear weapons system.			**0.434**
25	Policies should encourage personal responsibility rather than public, or government, responsibility for individual welfare.	**0.450**		
27	Schools established by parents and voluntary associations should be allowed to compete for public funds with state schools.	**0.353**		
28	Outsourcing to private companies could make the Scottish NHS more efficient.	**0.432**		
Overall scalability coefficient (H) for each scale		**0.402**	**0.371**	**0.458**

*Ec. L/R refers to the loading on the x-axis (Economic Left versus Right); GAL/TAN refers to the loading on the y-axis (GAL–TAN); Ind refers to the loading on the z-axis (Scottish Autonomy).

Items 1, 2, 3, 5 and 21 belong to the second scale, while Items 12, 14, 19 and 22 belong to the third scale (the z-dimension, representing autonomy).[8] Values for the item scalability coefficients for each scale are given in Table 3.

x, y and z scores for each user were calculated by summing users' responses to items in each of the three scales.[9] The three values obtained were then normalized by subtracting from each value the mean value for all users and dividing by the standard deviation. The final (x, y, z) values obtained therefore have a mean of 0 and a standard deviation of 1. Finally, the signs of the respective values were reversed when necessary so as to make positive values of x associated with the economic Right (and negative values with the

Left), positive values of y (GAL–TAN) with social conservatism (and negative values with social liberalism), and positive values of z (autonomy) with pro-independence sentiment (and negative values with a unionist stance).

Analysis of x, y and z values shows that party supporters have reasonably distinctive positions on the key issues that define political debate. In terms of the x and y dimensions, the two main parties in Scotland, the Scottish National Party (SNP) and the Scottish Labour Party, occupy similar positions on the (economic) centre-left, although SNP supporters are both slightly more right-wing in economic terms and rather more liberal in social terms than Labour supporters. The dimension that best differentiates these two parties, however, is the z-dimension with SNP supporters (unsurprisingly) significantly more pro-autonomy than Labour supporters. Among the smaller Scottish parties, the Scottish Conservative Party and the Scottish Green Party represent two extremes; Conservative supporters are by far the most right-wing party in economic terms (high values of x), are by far the most socially conservative (high values of y) and are even more unionist than Labour supporters (low values of z). Green Party supporters, on the other hand, are at the opposite end of the spectrum with respect to all three axes; they are the most economically left-wing, the most socially liberal and are also pro-autonomy (albeit slightly less so than the SNP).[10] Finally, supporters of the Scottish Liberal Democrats are at the same time more economically right-wing and more socially liberal than both Labour and the SNP, but are neither as socially liberal as Green supporters nor as economically right-wing as Conservative supporters. Liberal Democrat supporters are also mildly anti-independence, although their views on the matter are not as strong as either Labour or Conservative supporters. In Figure 1 the positions of all five parties are shown in terms of the means of their 'core' ideological supporters along the three axes. The means and standard deviations of each party's core ideological supporters are also given in Table format (see Table 4).

The question of representativeness

As we can see from Table 1, when compared to votes cast for parties in the Scottish election the sample of SVC users is not particularly representative of the population as a whole in terms of party support, consisting as it does of a greater proportion of Liberal Democrat and Green supporters than within the electorate at large. Moreover, a majority (61.4 percent) of users claim to have been educated to degree level, significantly more than the general adult population, and the average age of the sample is 34, rather less than the average age of the electorate as a whole (48).[11] As argued above, this, in itself, is not a problem, given that we are mapping a select group of party supporters and our sample does not, therefore, have to be representative of the general electorate. However, we do need to make sure that the policy dimensions we identify are valid and that our method for extracting them is sufficiently robust. It was therefore decided to retest our dimension reduction techniques on a more representative sample. To this end, we randomly sampled the SVC data to create a new sample in which users' voting intentions reflected that of the population at large.

In this way, we obtained a sample of 7,050 SVC respondents (out of 12,053) based on their voting intention for the regional lists.[12] For each party's voters, a number

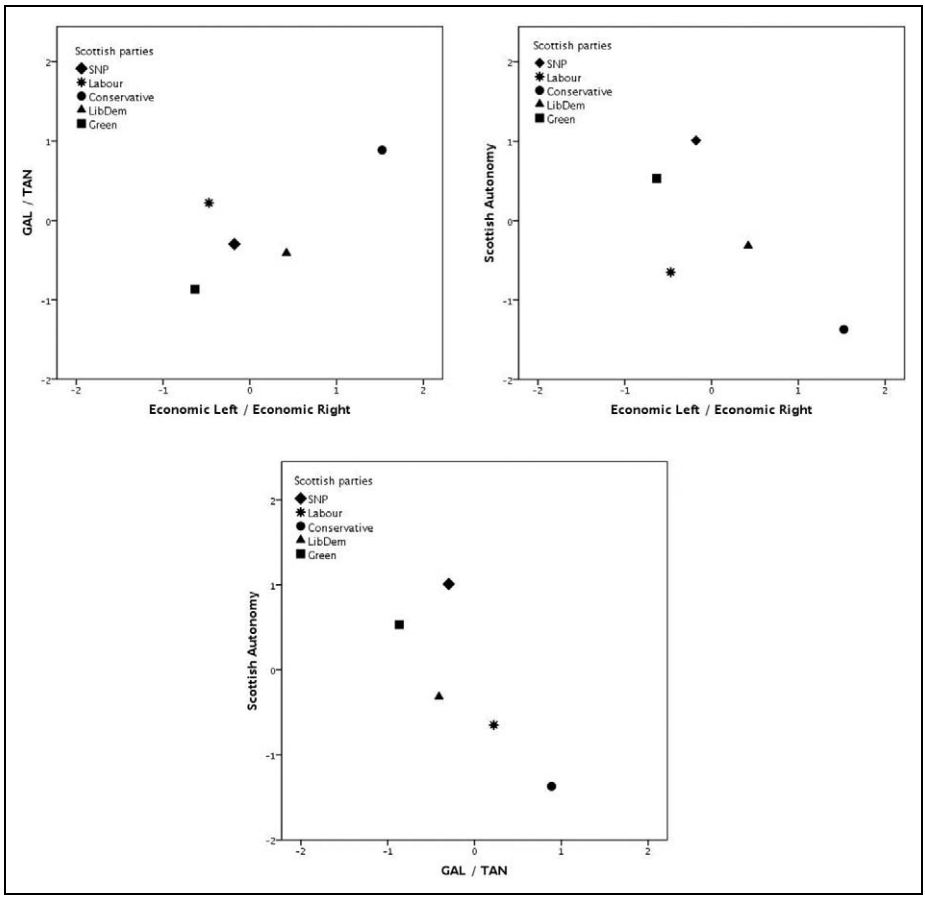

Figure 1. Positions of ideological party supporters in policy space (means).

Table 4. Means and standard deviation of positions of ideological party supporters

Means	SNP	Sc. Labour	Sc. Conservative	Sc. LibDem	Sc. Green
x (Economic Left–Right)	–0.18	–0.47	1.52	0.42	–0.63
y (GAL–TAN)	–0.30	0.22	0.89	–0.41	–0.87
z (Autonomy)	1.01	–0.65	–1.37	–0.32	0.53
Standard deviations					
x (Economic Left–Right)	0.87	0.80	0.75	0.84	0.85
y (GAL–TAN)	0.96	0.88	0.82	0.90	0.80
z (Autonomy)	0.67	0.71	0.64	0.70	0.71

proportional to that party's voting strength on polling day was randomly selected in such a way that the overall sample of 7,050 reflected the overall voting preferences of the Scottish population, and then a principal factor analysis was applied to the user

responses. As before, three latent policy dimensions were extracted. Table 5 gives the weights of each policy dimension extracted from this sample on each issue statement; these are similar to the values given in Table 2. The only significant differences are that: (i) Item 16 (on UK membership of the Euro), (ii) Item 17 (on the relative benefits of economic growth and reducing greenhouse gases) and Item 22 (on Trident) now no longer load as strongly onto the GAL–TAN (y) dimension (even though the latter still loads onto the autonomy dimension). This is entirely consistent with our earlier analysis, which showed that none of these items belonged to the GAL–TAN scale when Mokken scale analysis was applied (see above). Moreover, applying Mokken's automated item selection algorithm to the 14 items identified above as belonging to one or other of the three scales, but this time using the new, more representative sample, we find that the scales identified are exactly the same as those identified earlier using the original sample. This would suggest that the method for extracting dimensions is really rather robust, and it does not matter if the sample from which the dimensions are extracted is not quite representative of the population as a whole.

Party supporters or uncommitted voters?

It remains for us to address the question posed earlier on whether the users of the SVC whom we identified as 'core' party supporters really are party supporters rather than uncommitted voters with mild partisan leanings. In order to test this we compare data obtained from the SVC with data obtained from the Scottish Election Study 2011 (henceforth referred to as SES), which generated 2,046 respondents and was fielded by the polling organization YouGov. The two surveys had in common the following six issue statements:

1. For less serious offences, shorter, community sentences should replace imprisonment (Item 1).
2. Mandatory prison sentences for anyone found carrying a knife should be used to cut down on knife crime (Item 3).
3. The Scottish Government should make more use of tax-varying powers to raise revenue (Item 9).
4. In the current economic climate, the Government should maintain the size of the public sector (Item 10).
5. Free medical prescriptions for all should be abolished (Item 26).
6. University students should contribute to the costs of their education after graduation (Item 30).

Given the relatively small sample of respondents in the SES and the consequent small numbers of supporters of the minor parties, it was only feasible to compare the responses of supporters of three parties – the SNP, the Scottish Labour Party and the Scottish Conservative Party – to these six questions. Only these three parties can claim at least 100 respondents of the survey as their supporters.[13] Table 6 compares the mean scores and standard deviations of the samples of supporters of these three parties from (i) the (unweighted) data from the SVC, and (ii) the SES. Scores were calculated as follows: the response 'Completely Agree' was given a score of 1, 'Agree' a score of 2, 'Neither

Table 5. The policy space: Scotland (sample weighted by party support)

Item	Question	Ec. L/R*	GAL/TAN*	Aut*
1	For less serious offences, shorter, community sentences should replace imprisonment.	–0.1343	**–0.4418**	0.2481
2	To reduce crime, the criminal justice system must clamp down harder on illegal drug use.	0.1495	**0.5475**	–0.0821
3	Mandatory prison sentences for anyone found carrying a knife should be used to cut down on knife-crime.	0.0688	**0.5176**	–0.1849
4	We need to ring-fence the number of police.	–0.0192	0.1852	0.0866
5	People must accept more surveillance (CCTV) to fight against terrorism and other violent crimes.	0.0885	**0.4593**	–0.1872
6	A single Scottish police force would be the most efficient way to safeguard public safety.	0.1493	–0.0521	0.1105
7	The highest economic priority of the Government should be paying off the public debt in the short term.	**0.5682**	0.2406	–0.1524
8	Government policies should promote quality of life over economic growth.	**–0.4342**	–0.0750	0.2686
9	The Scottish Government should make more use of tax-varying powers to raise revenue.	–0.2323	–0.0741	0.3294
10	In the current economic climate, the Government should maintain the size of the public sector.	**–0.6181**	0.0282	0.1476
11	The third sector (voluntary organizations and charities) should have a larger role in providing public services.	0.3475	0.1187	0.0359
12	Scotland would be better off with an expansion of the powers devolved to the Scottish Parliament.	–0.1071	–0.0835	**0.7435**
13	In Westminster, new laws affecting England should only be voted on by MP's with English constituencies.	0.1773	0.0841	0.2959
14	Scotland would be better off, economically and socially, if it was an independent country within the European Union.	–0.0611	–0.0766	**0.7662**
15	Elections would be fairer if the Alternative Vote system replaced the First-Past-the-Post system.	–0.2009	–0.2676	0.3301
16	UK membership in the Euro should be ruled out indefinitely.	0.2143	0.3931	–0.1759
17	Economic growth is more important than reducing greenhouse gases.	0.3199	0.2963	–0.1974
18	Investment in public transport should be promoted through green taxes such as road taxes.	–0.2186	–0.1930	0.1620
19	Scotland must continue to build and use nuclear power stations.	0.2390	0.0940	**–0.4767**
20	Free bus passes should only be available for the least well off and not for all people over a particular age.	0.2713	–0.1097	–0.1085
21	A special policy on immigration should be established for Scotland, allowing more immigration into Scotland than England.	–0.1360	**–0.4752**	0.2979
22	Britain should scrap the Trident nuclear weapons system.	–0.2517	–0.3473	**0.5538**
23	The UK mission in Afghanistan is necessary in the fight against terrorism.	0.1783	0.2309	–0.3561

(continued)

Table 5. (continued)

Item	Question	Ec. L/R*	GAL/TAN*	Aut*
24	Local control of public services is more important than the efficiency gains from centralising services.	–0.1578	0.1947	0.1362
25	Policies should encourage personal responsibility rather than public, or government, responsibility for individual welfare.	**0.5840**	0.2437	–0.0615
26	Free medical prescriptions for all should be abolished.	0.3824	–0.0444	–0.3717
27	Schools established by parents and voluntary associations should be allowed to compete for public funds with state schools.	**0.4480**	0.2392	–0.0013
28	Outsourcing to private companies could make the Scottish NHS more efficient.	**0.5762**	0.1719	–0.2007
29	Spending on the Scottish NHS should be protected regardless of the total budget.	**–0.4524**	0.2818	0.2294
30	University students should contribute to the costs of their education after graduation.	0.3970	0.0928	–0.2478

*Ec. L/R refers to the loading on the x-axis (Economic Left versus Right); GAL/TAN refers to the loading on the y-axis (GAL–TAN); Ind refers to the loading on the z-axis (Scottish Autonomy).

Table 6. Mean scores and standard deviations on six common questions

SVC	SNP mean	SNP st. dev.	Sc. Lab mean	Sc. Lab st. dev.	Sc. Cons mean	Sc. Cons st. dev.	Spread of means
Item 1	2.06	1.00	2.33	1.08	2.98	1.24	0.92
Item 3	2.90	1.35	2.42	1.19	2.18	1.10	0.72
Item 9	2.37	1.02	2.68	1.03	3.33	1.18	0.96
Item 10	2.76	1.08	2.44	1.04	4.02	1.02	1.58
Item 26	4.06	1.12	3.45	1.32	2.50	1.25	1.56
Item 30	3.34	1.28	2.97	1.23	2.08	1.07	1.26
SES							
Item 1	2.61	1.35	2.95	1.27	3.18	1.28	0.57
Item 3	2.47	1.45	1.87	1.01	2.06	1.24	0.60
Item 9	2.45	1.11	2.77	1.21	3.70	1.28	1.25
Item 10	2.89	1.24	2.22	1.02	3.93	1.16	1.71
Item 26	4.03	1.32	3.33	1.41	2.64	1.39	1.39
Item 30	2.95	1.38	2.65	1.29	1.87	0.94	1.08

Agree nor Disagree' a score of 3, 'Disagree' a score of 4, 'Completely Disagree' a score of 5. The final column of Table 6 computes the difference in the mean scores between the most extreme parties on each issue statement. It shows that for four out the six statements the overall spread of the mean responses of the supporters of the three main parties is greater among users of the SVC than among respondents of the SES. Similarly, the standard deviations of the responses of party supporters are generally greater among respondents of the SES. This suggests that those identified as party supporters in the analysis of

data from the SVC, far from being uncommitted voters, are actually more polarized and coherent in their views than those identified as party supporters in the SES.

It should also be noted that our method of identifying party supporters and excluding those who either express no party preference or who are inconsistent in their choice of parties (i.e. those who identify with one party and express an intention to vote for another) helps to minimize the problem of uncommitted voters. Looking at Table 1 we see that nearly half of the SVC sample are 'unaffiliated' and therefore probably undecided or uncommitted voters.

Generally speaking, respondents of the SES were more socially conservative than the users of the SVC. This trend was more marked among SNP and Labour supporters than among Conservative supporters. There is evidence from a survey of SNP members that members and activists of this party are considerably more liberal than its voters and the electorate as a whole, tending to confirm that those who took part in the SVC may have been party supporters (Mitchell et al., 2011).

Validity of the findings

In a reasonably well-institutionalized party system like that of Scotland, we would expect that party supporters would share more or less the same policy orientations as the official party machine. Therefore, if the method that we have outlined in this article can indeed produce valid positions for party supporters within the policy space, these positions should correspond rather well with how experts in Scottish politics perceive the policy positions of each party. We can test this hypothesis by comparing the mean position of the supporters for each party on the x, y and z axes with the expert coding (see above) for that party by treating the party as a user and calculating its coordinates (x, y, z) in the same way. In the highly adversarial context of Scottish politics, policy differences are often exaggerated by the parties and media and a number of the policy positions coded by the experts reflect this. Moreover, official party positions need to show greater consistency across issues than we would expect from ordinary party supporters. We would therefore expect that parties (as measured by the expert coding) should occupy a position further from the origin (i.e. a more extreme position) than their supporters, but that the direction of the deviation from the origin should be more or less the same. Figure 2 adds the party positions generated by the coding (labelled by the letter P) to the positions of party supporters shown in Figure 1 (unlabelled in Figure 2).

As we can see from Figure 2, the party positions as reflected by expert codings do indeed reflect the position of party supporters, although (as expected) they are more extreme. For all five parties, expert codings place the party at a more extreme position in all three dimensions, except in the case of the autonomy (z) dimension for the Scottish Liberal Democrats in which experts placed the party at more or less the same position as party supporters. All in all, however, the relative positions of the parties as coded by experts and the relative positions of the 'parties in the electorate' are similar, suggesting that party supporters, while slightly more contradictory in their beliefs, share similar issue orientations with their party machines. It is interesting to note that the Scottish Labour Party now appears as a socially conservative party, despite its history as a left-wing progressive party; this clearly reflects the repositioning of the London-based

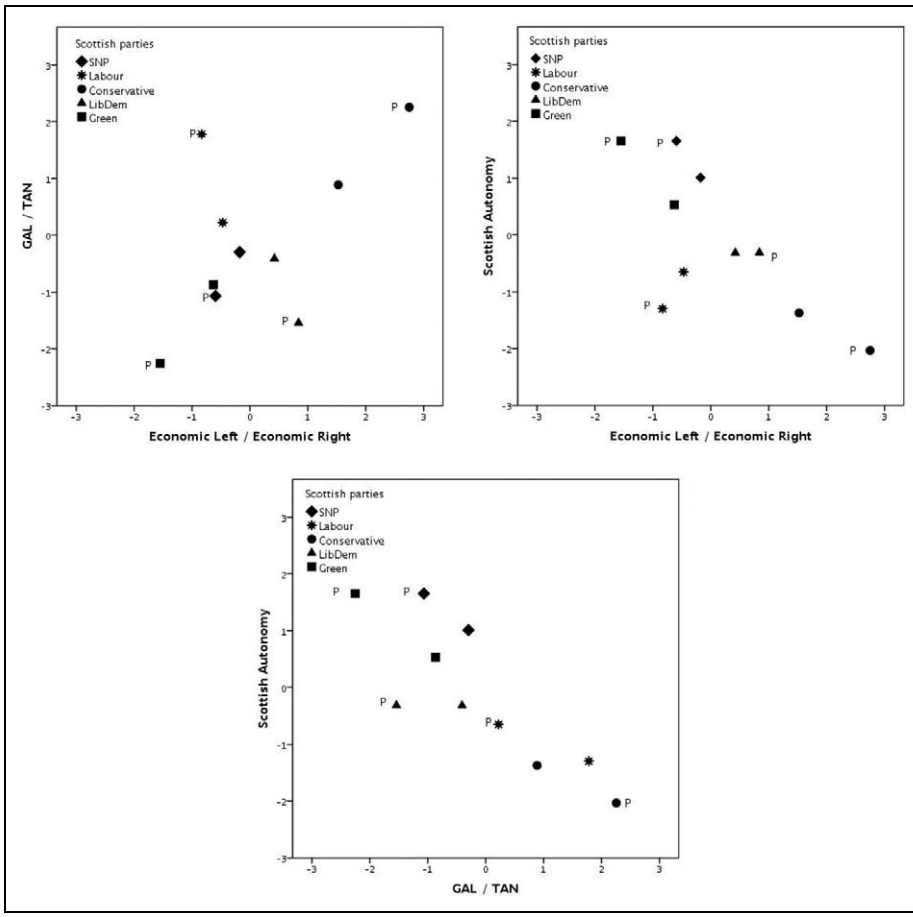

Figure 2. Positions of parties (coded by experts) and ideological party supporters.

party following Tony Blair's 'rebranding' of it under the New Labour label in 1997. However, the relatively large discrepancy observed between the orientations of Scottish Labour voters and that of the party machine along the GAL–TAN (y) dimension may suggest that ordinary Labour voters have not quite yet caught up with the conservative shift, manifested by increasingly uncompromising rhetoric articulated by the party elites on matters of law and order, security and immigration.

Conclusions

The first wave of VAA literature has mostly concentrated on VAA-centric topics such as the potential impact of VAAs on users or technical and design issues. This is both a welcome and an inevitable feature of the field given its embryonic nature. However, there are signs that the time could be ripe for the field to move in a new direction. Such a direction would be of more direct relevance to some of the traditional concerns of political

science, especially in the field of political behaviour and party politics. This article, by attempting to map the dimensionality of the Scottish political space and the policy orientations of Scottish party supporters, has made a modest contribution in this direction. Our basic claim is that an appropriately designed VAA and a cleaned dataset can indeed provide meaningful insights on party ideological positions. The findings from our experiment were largely intuitive in terms of the dimensions identified in the scholarly literature.

This study has shown that VAA-generated data can be useful in the study of political parties. First, such surveys can be used to identify the key policy dimensions that are pertinent in a given national context. Using data from the Scottish Vote Compass, three main policy dimensions emerged: one that corresponded very much to the traditional notion of Left and Right, based on views on how to run the economy, another that resembled the libertarian-authoritarian or GAL–TAN scale identified by Kitschelt and Marks, and a third that was defined by attitudes towards Scottish autonomy and independence. As well as providing insights into how the Scottish policy space is constructed, the identification of this third independent dimension could have relevance for other European nations, such as Catalonia or the Basque country. The robustness of the techniques used to extract the three dimensions (factor analysis followed by Mokken scale analysis) was affirmed when similar results were obtained by repeating the technique on a derivative sample from the dataset that had been selected to simulate greater representativeness. Second, by including in the survey questions about party affiliation, vote intention and reasons for party choice, it was possible to map the policy positions of 'core' supporters of the main political parties in Scotland based on the policy dimensions identified. The mapping obtained corresponded well with expert opinions on party positions. A comparison with data obtained from the Scottish Election Survey showed that party supporters identified by the SVC showed a rather higher degree of consistency overall in their views than those identified by the SES, which would seem to refute the argument that VAAs are used only by those who have not yet decided how to vote.

Within the Scottish context, the 'autonomy' dimension incorporates not only attitudes to Scotland's constitutional status but also perceptions of the parties' abilities to protect Scottish interests within the existing constitutional order. What has emerged from previous studies (Johns et al., 2010) is evidence that even when a party's constitutional preference is not supported by the electorate, the articulation of that preference may be seen as indicative of whether the party will 'stand up for Scotland'. This suggests that from the perspective of the voters the independence issue *per se* may be less important than a preference for policies that defend Scottish interests overall. This version of the old centre-periphery cleavage has become a central feature of modern Scottish politics. At the same time, however, the issue of Scottish autonomy and the defence of Scottish interests does not seem to reflect the social cleavage between winners and losers of globalization identified by Kriesi et al. Studies show that supporters of the pro-independence SNP are predominantly middle class and cannot be thought of as 'losers' in the globalization process (Mitchell et al., 2011). It is noteworthy that the autonomy dimension is fully independent of the GAL–TAN dimension and SNP supporters are, if anything, culturally liberal (see Figure 1), unlike the parties of the populist right that Kriesi et al. (2006) identify as reflecting the values of globalization's 'losers'.

The main benefit of VAA-generated data over conventional survey data is that they can potentially provide far more insights into the construction of policy spaces because, as a rule, they include far more questions on policy positions. It is rarely practical to include 30 policy statements in a face-to-face survey and user responses to a small number of policy statements are less amenable to the sort of dimension reduction techniques described in this article. Overall, we can conclude that the method outlined here provides a useful addition to the repertoire of methods that have been used so far in the mapping of political parties. We can expect that the VAA will be developed as a tool for party mapping much further in the future.

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Notes

1. The datasets used for this article are available upon request from the authors for replication purposes.
2. The authors were in charge of coordinating the coding by experts.
3. Elections to the Scottish parliament in Holyrood are based on a mixed-member proportional system, known as the Additional Member System in Scotland. Voters have two votes: one for a member of the Scottish Parliament (MSP) to represent the constituency and one for a regional party list.
4. Responses were stored in numerical form; the response 'Completely Agree' was coded with the value 1, 'Agree' with the value 2, 'Neither Agree nor Disagree' with the value 3, 'Disagree' with the value 4, 'Completely Disagree' with the value 5 and 'No Opinion' with the value 99 (which was excluded from subsequent analysis).
5. The data were cleaned by excluding the following entries: (1) all cases in which the time taken to complete the 30 issue statements was less than 120 seconds; (2) all cases in which the time to respond to any one issue statement was less than two seconds; (3) all cases in which the time taken to respond to three or more issues statements was less than 3 seconds; (4) all cases in which the respondent answered 15 successive issue statements in the same way; (5) all cases in which the user did not supply supplementary data; (6) all cases in which the user entered data from outside the United Kingdom. Finally, to make provisions for cases in which an individual completes a questionnaire more than once, a filtering technique was used to identify multiple entries from the same computer, which were then removed.
6. Even the most casual observer of Scottish, or even wider British, politics will immediately notice that the proportion of Green Party supporters in the data far exceeds their relative size in the general electorate. Interestingly, in Scotland, it is the Nationalists (the 'cyber-nats' as they are known) who have the reputation for being overly represented in the online political participation. It would seem that the Greens are also over-represented in online participation. While we address the issues of the representativeness of the sample below, one positive aspect of the exuberant Green Party supporters' participation in the Scottish Vote Compass is that it provides a unique set of data on the policy positions of the 'smaller' party in Scotland.

7. The first group (x) consisted of Items 7, 10, 11, 25, 27, 28, 29 and 30; the second group (y) consisted of Items 1, 2, 3, 5,15, 16, 17 and 21; the third group (z) consisted of Items 12, 14, 19, 22 and 26. See Table 2 for reference.
8. Mokken scale analysis thus appears to resolve the ambiguity of which scale Item 22 belongs to – autonomy or GAL–TAN – by placing it clearly on the former.
9. For the purposes both of the Mokken analysis and for aggregating dimensions, the 'direction' of a given variable was reversed when appropriate.
10. The Scottish Green Party officially supports Scottish independence.
11. Estimates for the average age of the electorate were taken from Population Estimates Time Series Data obtained from the website of the General Register Office for Scotland (see www.gro-scotland.gov.uk).
12. In this way it was possible to sample supporters of smaller parties that did not take part in the constituency vote.
13. A respondent was considered to be a supporter of a given party if he/she thought of himself/herself as a supporter of that party, and deemed himself/herself as most likely to support that party in both the regional vote and (if appropriate) the constituency vote.

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